

What is claimed is:

1. An electrostatic chuck to hold a substrate in a process chamber, the electrostatic chuck comprising:

(a) an electrode comprising a wire loop that extends substantially continuously about a perimeter of the electrode and has a radially outwardly facing surface that is substantially rounded; and

(b) a dielectric covering the electrode.

2. An electrostatic chuck according to claim 1 wherein the wire loop has a substantially circular cross-section.

3. An electrostatic chuck according to claim 2 wherein the substantially circular cross-section has a diameter that is larger than the cross-sectional thickness of the electrode.

4. An electrostatic chuck according to claim 1 wherein the electrode comprises a wire mesh.

5. An electrostatic chuck according to claim 1 wherein the wire loop has a diameter of at least about 3 micrometers.

6. An electrostatic chuck according to claim 1 further comprising a sidewall edge and wherein the current leakage through the sidewall edge is less than about 100 μA .

7. A substrate processing apparatus for processing a substrate, the substrate processing apparatus comprising:

(1) a process chamber comprising the electrostatic chuck of claim 1 to hold a substrate in the process chamber;

(2) a gas distributor to introduce a process gas into the process chamber;

(3) a gas energizer to energize the process gas in the process chamber to process the substrate; and

(4) a gas exhaust to exhaust the process gas from the process chamber.

8. An electrostatic chuck to hold a substrate in a process chamber, the electrostatic chuck comprising:

- (a) an electrode comprising:
 - (i) a central planar portion comprising a top surface and a bottom surface, and
 - (ii) a peripheral arcuate portion having a tip with an upper surface, the arcuate portion having curvature length of at least about $\pi/8$ radians between a normal to the top surface of the central planar portion and a normal to the upper surface of the tip; and
- (b) a dielectric covering the electrode.

9. An electrostatic chuck according to claim 8 wherein the peripheral arcuate portion has a curvature diameter of at least about 3 micrometers.

10. An electrostatic chuck according to claim 8 wherein the peripheral arcuate portion the tip of the peripheral arcuate portion extends substantially entirely beyond the bottom surface of the central planar portion.

11. An electrostatic chuck according to claim 8 wherein the electrode comprises a wire mesh.

12. An electrostatic chuck according to claim 8 further comprising a sidewall edge and wherein the current leakage through the sidewall edge is less than about 100 μA .

13. A substrate processing apparatus for processing a substrate, the substrate processing apparatus comprising:

- (1) a process chamber comprising an electrostatic chuck according to claim 8 to hold a substrate in the process chamber;
- (2) a gas distributor to introduce a process gas into the process chamber;
- (3) a gas energizer to energize the process gas in the process chamber to process the substrate; and
- (4) a gas exhaust to exhaust the process gas from the process chamber.

14. An electrostatic chuck to hold a substrate in a process chamber, the electrostatic chuck comprising:

- (a) an electrode comprising:
 - (1) a central planar portion comprising a top surface and a bottom surface; and
 - (2) a peripheral arcuate portion having a tip, the arcuate portion having:
 - (i) a curvature length of at least about $\pi/8$ radians between a normal to the top surface of the central planar portion and a normal to the upper surface of the tip; and
 - (ii) a curvature diameter of at least about 3 micrometers; and
- (b) a dielectric covering the electrode.

15. An electrostatic chuck according to claim 14 further comprising a sidewall edge and wherein the current leakage through the sidewall edge is less than about 100 μA .

16. An electrostatic chuck according to claim 14 wherein the electrode comprises a wire mesh.

17. A substrate processing apparatus for processing a substrate, the substrate processing apparatus comprising:

- (a) a process chamber comprising an electrostatic chuck according to claim 14 to hold a substrate in the process chamber;
- (b) a gas distributor to introduce a process gas into the process chamber;
- (c) a gas energizer to energize the process gas in the process chamber to process the substrate; and
- (d) a gas exhaust to exhaust the process gas from the process chamber.